DIGITAL TWINS IN THE CONTEXT OF DISASTER PREPAREDNESS: FUSION OF GIS AND GAME ENGINES

Digital twins aim at reproducing selected aspects of the real world into a virtual replica.

**Game engines** enable powerful visualisations while **GIS** allow for the processing of digital twins data formats.

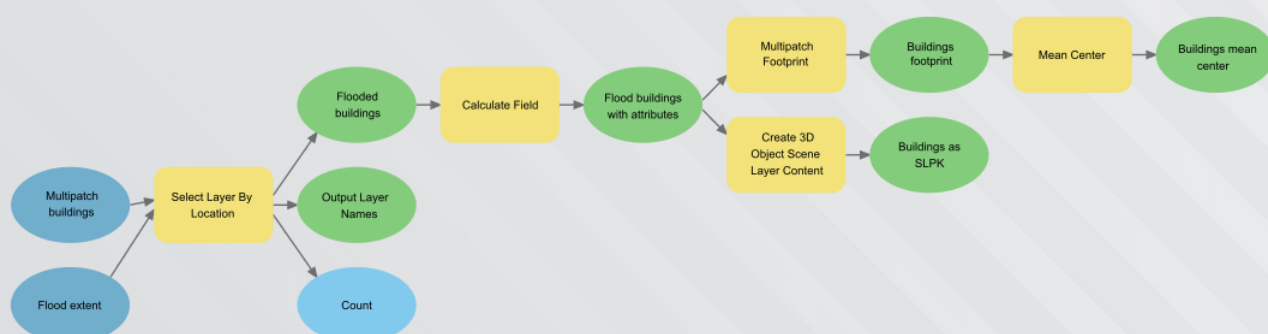The goal of this work is to **bridge the gap** between these tools.

Diploma Thesis

Objectives

- **Analyse**, **test** and **describe** integration methods between GIS and game engines
- **Implement** the selected methods through a suitable thematic area
- **Develop** an XR visualisation framework
- **Evaluate** the implementation and alternatives

Implementation
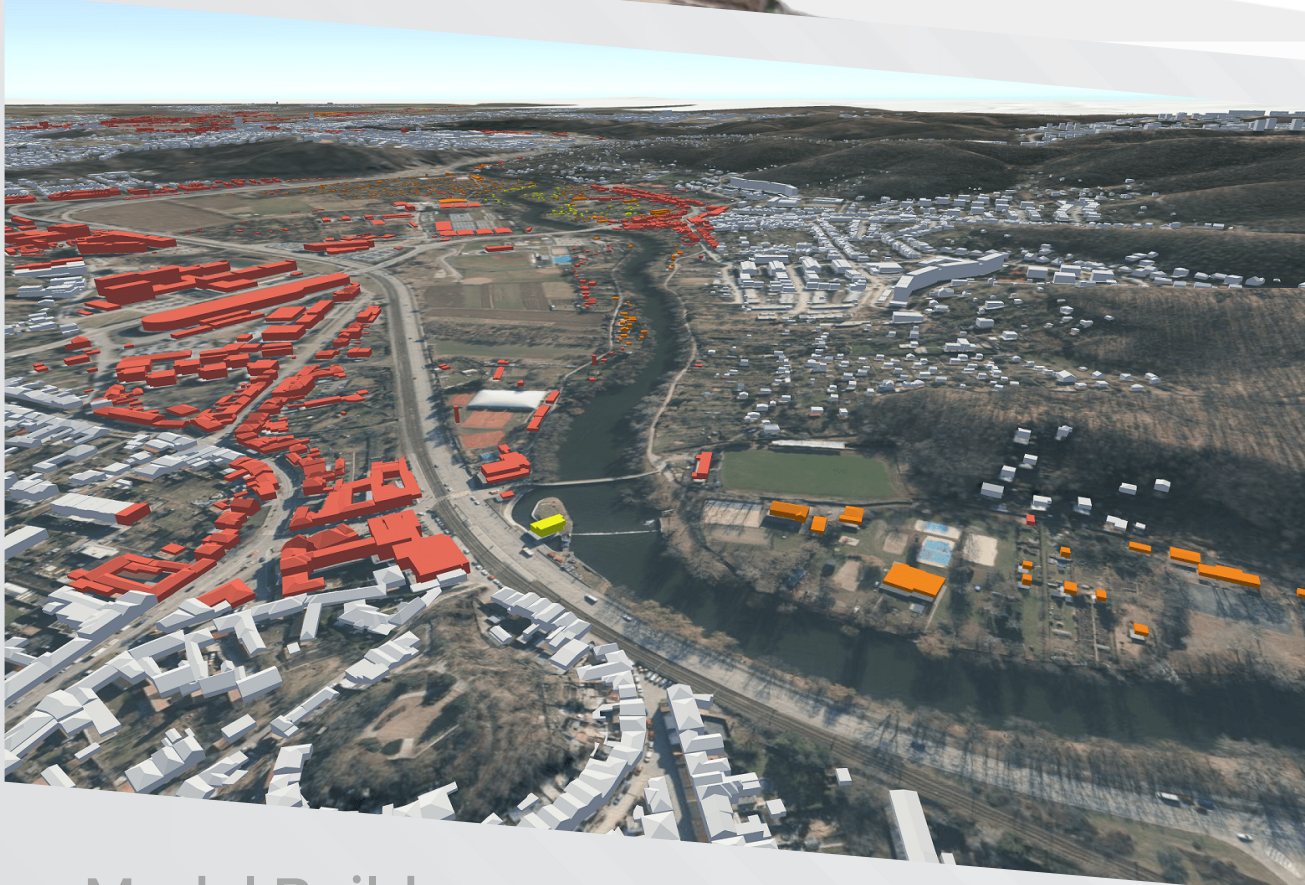
Model Builder

Methodology

Data collection

Acquiring thematic data as SHPs: flood extent layer and city building models

Data processing

Enriching building layers with flood data through the ArcGIS Model Builder

Data integration

Loading ArcGIS layers into Unity for VR visualisation in a scalable manner

User Evaluation

Testing implementation through a questionnaire to analyse data perception

Results

- OpenXR-supported VR application
- Implementation workflow in Unity
- Strengths and weaknesses of the approach
- Set of alternative tools and methods
- Conceptual user testing output

Conclusions

Technology is evolving rapidly: game engines and GIS have reached a **state of maturity** with integration solution in development.

Interoperability is limited but with the help of tools such as the ArcGIS Maps SDK for Unity, **integration is possible and scalable**. Conceptually, VR was shown to be able to convey complex geospatial information in an immersive manner, while being entertaining.

However, there are limitations to the integration tools. Not all **standards and interfaces** are supported, and these consist in mostly **commercial solutions**. As time passes, these solutions will improve and enable more seamless integration processes.

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